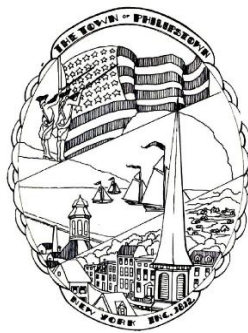




# **2016 Government Operations Greenhouse Gas (GHG) Emissions Inventory Report**

**Town of Philipstown**



**Completed June 2019**

# 1. Introduction

In light of the growing threats of climate change, the Town of Philipstown Town Council decided in June of 2017 to officially join a New York State Department of Environmental Conservation (NYSDEC) certification program called “Climate Smart Communities.” The goal of this point-based certification program is to foster state and local partnerships and encourage climate action across New York State by rewarding participating communities with technical assistance, grant funding opportunities and various certification levels based on points earned from completing climate-related actions. Specifically, the program is designed to help municipalities around NYS *mitigate* their greenhouse gas (GHG) emissions (which contribute to climate change) while simultaneously *adapting* to the already inevitable effects of climate change.

The Town’s first two steps - completed in October of 2017 - were to appoint a Climate Smart Coordinator and form a Climate Smart Task Force to serve as a steering committee to guide the Town towards Climate Smart certification. The next recommended step in the program was to complete a Government Operations GHG Emissions Inventory to measure annual emissions and energy expenses from government activities, and establish a baseline from which to begin reducing emissions from buildings, vehicles, etc.). Fortunately, the Town of Philipstown, after appointing its Climate Smart Coordinator and Task Force, was invited by the Hudson Valley Regional Council to join the Ulster-based “Climate Action Planning Institute” (CAPI), which brought together Climate Smart Coordinators from six municipalities at monthly workshops between May 2018 - April 2019 to complete Government Operations GHG Emissions Inventories for their respective municipalities.

The results of that year-long effort are this report as well as the accompanying GHG Inventory spreadsheet, both of which were completed by the Town’s Climate Smart Coordinator, Roberto Muller. This inventory will guide the Town in making informed decisions to progressively reduce its Government Operations Emissions over the years to come and also save money while doing so. The economic benefits of many of the existing solutions for emission reduction are already well-proven, including weatherizing and better insulating buildings, replacing old inefficient equipment and vehicles with new efficient models, purchasing renewable electricity for government electricity accounts, and installing renewable electricity generation sources, such as solar panels, on government facilities and / or property. These next steps will be described at the end of this report as a suggestion for next steps following this inventory.

The Town of Philipstown would like to thank the Hudson Valley Regional Council, especially former Clean Energy Communities Coordinator Europa McGovern for leading the CAPI

workshops, as well as Jim Yienger and Gregory Mumby of Climate Action Associates for their technical guidance on completing this inventory, and especially for their help in gathering bulk municipal electricity usage data from Central Hudson Gas & Electric. The Town also thanks the New York State Energy Development and Research Authority (NYSERDA) for funding the Climate Action Planning Institute via their Clean Energy Communities program.

## **2. Significance of Climate Change**

Unfortunately, clear proof of the significant impacts of climate change on the environment and people worldwide were first fully confirmed by scientists in 1989—although indications that a dire future was coming were present as early as the 1950s. The rest of us have more or less been rising to that awareness since. The understanding comes in two forms: worldwide and regionally. The former is a wide and comprehensive view that confirms that our world is moving rapidly towards potential irreversible environmental chaos and degradation, and the latter impacts us both immediately and in the future on the local level.

The Northeast National Climate Assessment reported that the Northeast has populations that are highly vulnerable to climate hazards such as heat waves, ice storms, floods, droughts, hurricanes and major storms. Tropical Storm Irene (August 27-29, 2011), for example wreaked such havoc that streams and rivers wiped out bridges, displaced people and livestock, destroyed property and took lives. Clearly local infrastructure was not equipped to handle the excessive amounts of precipitation that flooded the area. Between 1958 and 2010, the Northeast experienced more than a 70% increase in the amount of precipitation falling in very heavy events (the heaviest 1% of all daily events). News and media outlets daily report catastrophes, both natural or precipitated by some human activity, that illuminate the latest major storm event or consequence, or provides us with warnings about the polar ice caps melting, coral reefs dying, species becoming extinct, and other disasters that were heretofore seen as nature-driven if they happened at all. Now these events are phrased within the context of human activities since the Industrial Age that have raised the worldwide temperature.

The amount of warming in the Northeast is dependent on global emissions of heat-trapping greenhouse gases. A warming of 4.5 degrees to 10 degrees Fahrenheit is projected by the 2080s unless global emissions are reduced substantially, and the frequency, intensity and duration of heat waves are expected to increase. These increases will adversely affect vulnerable populations, infrastructure, agriculture, and ecosystems (U. S. Global Change Research Program). To make matters worse, the adverse economic consequences resulting from climate change could be as severe as the physical damage these events cause.

### 3. Methodology

In order to establish a baseline from which to reduce government GHG emissions in the years ahead, the Town of Philipstown set out to complete a Government Operations GHG Emissions Inventory following the guidance of the “Local Government Operations GHG Protocol.” This protocol recommends measuring at least two types of emissions and an optional third type, all three of which the Town decided to measure:

- Scope 1 - Direct GHG emissions from sources that are owned or controlled by the reporting entity (natural gas, propane, heating oil, kerosene, gasoline and diesel from government facilities and government vehicles). REQUIRED
- Scope 2 - Indirect GHG emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity (electricity). REQUIRED
- Scope 3 - Indirect GHG emissions from activities other than electricity (e.g. employee commute emissions). OPTIONAL

Once the scope of work was identified, the project involved five major steps:

1. Develop a Facilities Master List to track all energy accounts for government facilities.
2. Scope 1 - Review Town energy usage records (e.g. heating fuel, vehicle fuel usage, etc.) from the most recent available year (2016).
3. Scope 2 - Request Bulk Municipal Electricity Usage Data from Central Hudson for 2016.
4. Scope 3 - Request that Town employees complete an Employee Commute Survey.
5. Enter data for facility energy usage and aggregate vehicle fuel usage into the GHG Emissions Inventory Tool provided by the CAPI program, which automatically converted energy usage data into GHG Emissions numbers for various fuel usage types and facilities.

### 4. Results

The Town of Philipstown produced a total of 649.01 Metric Tons of CO<sub>2</sub>-equivalent (MTCO<sub>2</sub>e) emissions (Scope 1 and Scope 2) during 2016. The Town spent a total of \$123,222 on energy usage during this same period. Although not included in the Town totals, Philipstown employees collectively produced a total of 62.42 MTCO<sub>2</sub>e during 2016 as a result of commuting from home to work and vice versa (Scope 3). Table 1: GHG Emissions by Energy Source shows the breakdown of these results by energy source (next page).

**Table 1: GHG Emissions by Energy Source:**

<b>Energy Source</b>	<b>2016 MTCO<sub>2</sub>e</b>	<b>Energy Cost</b>	<b>% GHG</b>
Employee Commute*	62.42	-	-
Electricity	89.36	\$29,701	13%
Heating Oil	220.37	\$29,572	32%
Gasoline	175.60	\$31,097	25%
Diesel	207.99	\$32,634	30%
Propane	0.69	\$218	0%
<b>Total:</b>	<b>649.01</b>	<b>\$123,222</b>	<b>100%</b>

\* *Not included in Totals due to being a Scope 3 emissions source*

Interestingly, due to the Town's electricity coming from the NY Upstate electricity grid, which is one of the cleanest (lowest emissions) grids in the country, the Town had only 13% of its emissions come from electricity, despite spending 25% of its energy expenditures on this source. This is the result of the local grid primarily consisting of electricity generated by hydroelectric, nuclear and natural gas power plants, the first two of which produce zero operational emissions per kilowatt-hour of electricity generated. Impressively, a solution exists to further improve this situation and bring the Town's electricity emissions down to zero. This will be explored in the Discussion section of this report.

The majority of the Town's emissions come from heating oil for government buildings, as well as gasoline and diesel fuel for government vehicles (which primarily consists of the Town Highway Fleet). The Town also uses a miniscule amount of propane for kitchen stoves, which was included in this report for thoroughness, but can essentially be ignored. In total, 55% of emissions come from vehicle fuel, 43% from administration / program facilities, and 2% from water delivery facilities. Employee Commute emissions reflected the impact from employees driving from home to work and back, although there were a small number of employees that walked to work from nearby homes. This will be explored in further detail in the discussion section, especially regarding potential solutions to reduce emissions from this Scope 3 source.

In terms of government vehicle fuel usage, the Highway Department produced the vast majority of emissions (360 MTCO<sub>2</sub>e), followed by small amounts from the Recreation Department (13 MTCO<sub>2</sub>e) and Building Department (9 MTCO<sub>2</sub>e). The Highway Department has 25 vehicles, most of which are heavy-duty trucks that have very low fuel efficiencies. On the other hand the

Recreation Department had only two vehicles and the Building Department had only one vehicle in 2016, although it has added a second since then.

With respect to heating fuel and electricity usage, the GHG Inventory also broke down emissions by facility in order to determine which facilities are the biggest culprits and should thus be prioritized for energy efficiency solutions. Table 2: GHG Emissions by Facility clearly shows that the Town Recreation Center, which is a +20,000 square foot building, produces an enormous amount of emissions (161.95 MTCO<sub>2e</sub>) and costs much more (\$30,913) to operate compared to other facilities. Interestingly, 120 MTCO<sub>2e</sub> of the Recreation Center Emissions are from Heating Oil while only 34.30 MTCO<sub>2e</sub> are from electricity usage. This suggests that efforts to reduce emissions from this facility will need to heavily focus on reducing emissions and energy usage from space heating.

**Table 2: GHG Emissions by Facility:**

Facility	Metric Tons CO <sub>2e</sub>	Tons CO <sub>2e</sub> / ft <sup>2</sup>	Energy Cost
Recreation Center	161.95	7.85	\$30,913
Highway Garage + Trailer	55.37	12.77	\$12,555
Town Hall	42.46	8.80	\$10,091
Depot Theater	24.86	17	\$5,056
Aqueduct Rd Pump House	9.04	9.42	\$5,117
CVPD Club House	8.26	3.30	\$3,206
GLWD Pump House	4.95	51.56	\$2,090
Highway Salt Shed	1.33	0.30	\$833
CVPD Bath House	0.99	1.32	\$732
Howland Dr Pump House	0.41	6.51	\$574
Recycling Center	0.28	0.27	\$542
Arden Dr Pump House	0.18	2.86	\$508
Philipstown Park Welcome Sign	0.12	-	\$344
CVPD Stone Barn	0.12	0.09	\$366
CVPD Work Shop	0.09	0.10	\$354

A few other buildings - the Highway Garage + Office Trailer, Town Hall and the Depot Theater - each produce a substantial amount of emissions as well, and similarly most of these emissions come from heating these buildings. This will be covered more in the discussion section, but briefly, each of these buildings is old and inefficient, which presents many opportunities for improving the performance of these buildings, reducing annual energy expenses and reducing GHG emissions.

Another note of interest is the comparative emissions produced by each facility when divided by the square footage of the building. This can potentially reveal which buildings are most efficient or inefficient, although there are a few exceptions: the pump houses use a large amount of electricity to pump public water supplies and thus are not accurately represented by emissions per square footage measurements. These pump houses instead require an analysis of the energy efficiency of their water pumps, the solution to which will be explored in the Discussion section. On the other hand, this per square footage metric clearly shows that the Town Depot Theater is the least efficient building in terms of space heating and additional electricity usage, with 17 MTCO<sub>2e</sub> produced per square foot each year. This is the result of the building being very old (a historic building in fact) and unfortunately energy inefficient, which leads the facility to use a lot of energy to stay warm or cool depending on the season. The Town Highway Garage + Office Trailer, Town Hall, Recreation Center, and Continental Village Park District (CVPD) Club House are the other non-pump-house energy users, both in totals and per square foot, as the table shows.

Finally, the GHG Inventory spreadsheet that accompanies this report includes an interactive Chart in the GHG Inventory sheet, at the bottom in Section 7. Monthly Electricity Use and Cost by Facility. This section allows the user to compare monthly electricity usage and expenses per facility selected from a drop down list above the chart. The section gives the option of showing usage for “natural gas” as well, but the Town has no natural gas accounts, so this option can be ignored.

## **5. Discussion**

The results of the 2016 Government Operations GHG Emissions Inventory suggest several clear issues as well as solutions to begin to reduce government operation emissions each year. Furthermore, this inventory should serve as a basis for the Town to set its GHG Emissions Reduction Targets (e.g. 20% by 2025) and develop a Climate Action Plan to map out the steps it will take to reduce emissions and save money on energy expenditures.

Based on the results of the inventory, the clear issues that need solving are:

1. High fuel usage and corresponding emissions of Town vehicles
2. High heating fuel usage and corresponding emissions of Government Buildings
3. Electricity Consumption that is not from 100% Clean Energy Sources.

Luckily, the solutions to each of these issues exist and the Town can to work immediately:

1. Complete a Fleet Inventory to assess the fuel efficiency, usage history and age of all vehicles. Adopt a Fleet Efficiency Policy to set standards and timelines for replacing existing vehicles with new efficiency versions as well as purchasing efficient new models when fleet expansion is necessary. Progressively replace inefficient vehicles with more efficient models in the decades ahead.
2. Complete ASHRAE Level 2 or higher energy audits on all Government Buildings to determine where energy usage (both heating fuel and electric consumption) is happening, what the sources of inefficiency are, and what efficiency measures may be pursued to improve building performance, reduce annual energy expenses and reduce emissions from space heating. Progressively implement energy efficiency measures on government buildings in the decades ahead.
3. Adopt a law to join a local Community Choice Aggregation program - Hudson Valley Community Power - to provide, by default, 100% Renewable electricity to all government, commercial and residential electricity accounts within Philipstown. Similarly, participate in a Community Solar program to encourage local electricity account holders to join a local Community Solar farm. Install renewable energy, such as a solar panel array, on government property to generate clean electricity on site.

The Town of Philipstown and its Climate Smart Task Force will work in the years ahead to implement the above-recommended solutions. The Town will also conduct a follow-up Government Operations GHG Emissions Inventory in 2022 using data from calendar year 2021 to measure the Town's progress in reducing its emissions. This inventory should thus be updated every five years to measure the Town's progress and should align with the Town's timelines for setting Emission Reduction Targets, as noted above.

Lastly, this Government Operations Inventory will be followed by a Community GHG Emissions Inventory, which will measure emissions at the community scale. Following the completion of the Community Inventory, the Town will move to establish Emissions Reduction Targets for both the Government Operations and Community levels, which will then inform the development of Climate Action Plans for each source of emissions. This will include timelines and targets for reducing emissions, recommendations for specific solutions to reduce emissions from each sector, and financial calculations for the costs of implementing each solution. This



Climate Action Plan will involve large-scale community participation, including the involvement of key stakeholders within the community, and efforts at both the Government Operations and Community level will be published extensively throughout the community.